CLAIMS

What is claimed is:

1. A rocket motor having insensitive munitions capability, the rocket motor comprising:

a case that is rupturable at an internal pressure burst level, the case comprising:

a propellant located in the case, the propellant formulated to thermally expand when heated to a temperature below an autoignition temperature of the propellant and to apply an internal pressure to the case that is less than the internal pressure burst level of the case; and

an insensitive munitions charge located in the case, the insensitive munitions charge formulated to release gas when heated to a temperature above an autoignition temperature of the insensitive munitions charge, wherein the released gas in combination with the internal pressure applied by the propellant is sufficient to raise internal pressure inside the case above the internal pressure burst level of the case.

2. The rocket motor of claim 1, wherein the propellant is formulated to undergo thermal expansion so as to fill free volume inside the case.

3. The rocket motor of claim 1, wherein the insensitive munitions charge is formulated to have an autoignition temperature below the autoignition temperature of the propellant.

4. The rocket motor of claim 1, wherein the internal pressure applied by expansion of the propellant and the gas released by the insensitive munitions charge is selected to rupture the case before the propellant reaches its autoignition temperature.

5. The rocket motor of claim 1, wherein the propellant is formulated to undergo thermal expansion so as to fill the free volume of the case with the propellant at about 66°C.

6. The rocket motor of claim 1, wherein the propellant is formulated to have an autoignition temperature of about 238°C.

7. The rocket motor of claim 1, wherein the insensitive munitions charge is formulated to have an autoignition temperature of at least about 56°C below the autoignition temperature of the propellant.

8. The rocket motor of claim 1, wherein an internal pressure of the gas released by the insensitive munitions charge is not more than 25 percent of the internal pressure applied by the thermal expansion of the propellant.

9. The rocket motor of claim 1, wherein the case comprises a cylindrical region, a closed forward end, and an aft assembly, the aft assembly comprising an aft closure member provided with an opening.

10. The rocket motor of claim 1, further comprising:

a nozzle assembly coupled to the case, the nozzle assembly comprising a nozzle passageway; and

an igniter assembly operational between an inactive state, in which the nozzle passageway is obstructed, and an activated state, in which the igniter assembly is functional to ignite the primary propellant grain and the nozzle passageway is substantially unobstructed to permit flow through the nozzle passageway.

11. The rocket motor of claim 1, wherein the insensitive munitions charge is situated between the aft closure member and the propellant.

12. The rocket motor of claim 1, further comprising a rubber insulator comprising a radially extending portion situated between the propellant and the aft assembly, wherein the insensitive munitions charge is situated in contact with the radially extending portion of the rubber insulator.

13. The rocket motor of claim 1, further comprising a rubber insulator comprising a radially extending portion and an axial extension, the radially extending portion of the rubber insulator being situated between the propellant and the aft assembly, the axial extension being situated between the propellant and the cylindrical region of the case.

14. The rocket motor of claim 13, wherein the axial extension of the rubber insulator is spaced radially from the cylindrical region of the case to form a cylindrical void area therebetween.

15. The rocket motor of claim 1, further comprising a throat-barrier member for obstructing the nozzle passageway.

16. The rocket motor of claim 15, wherein the throat-barrier member comprises an erosive nozzle piece.

17. The rocket motor of claim 1, further comprising a secondary insensitive munitions charge positioned in close proximity to an aft surface of the propellant, the second insensitive munitions charge having an autoignition temperature at which the second insensitive munitions charge autoignites to release gas, the autoignition temperature of the second insensitive munitions charge being below the autoignition temperature of the propellant and being above the autoignition temperature of the insensitive munitions charge.

18. A method of rupturing a case in a rocket motor, comprising:

applying an internal pressure to the case from a propellant disposed therewithin, wherein the internal pressure from the propellant is less than an internal pressure burst level of the case; and

applying an internal pressure to the case from an insensitive munitions charge, wherein the internal pressure from the propellant in combination with the internal pressure from the insensitive munitions is greater than the internal pressure burst level of the case.

19. The method of claim 18, wherein applying an internal pressure to the case from a propellant comprises heating the propellant.

20. The method of claim 19, wherein heating the propellant comprises thermally expanding the propellant to fill a free volume of the case.

21. The method of claim 18, wherein applying an internal pressure to the case from a propellant comprises heating the propellant to a temperature less than an autoignition temperature of the propellant.

22. The method of claim 18, wherein applying an internal pressure to the case from an insensitive munitions charge comprises heating the insensitive munitions charge to an autoignition temperature.

23. The method of claim 22, wherein heating the insensitive munitions charge to an autoignition temperature comprises heating the insensitive munitions charge to an autoignition temperature that is at least 56°C less than the autoignition temperature of the propellant.

24. The method of claim 18, wherein applying an internal pressure to the case from an insensitive munitions charge comprises heating the insensitive munitions charge to an autoignition temperature of no greater than about 181°C.

25. The method of claim 18, wherein applying an internal pressure to the case from an insensitive munitions charge comprises releasing gas produced by the insensitive munitions charge into the case.

26. The method of claim 18, wherein applying an internal pressure to the case from an insensitive munitions charge comprises applying an internal pressure of the insensitive munitions charge that is not more than 25% of the internal pressure of the propellant.

27. The method of claim 18, wherein applying an internal pressure to the case from an insensitive munitions charge comprises autoigniting the insensitive munitions charge to release the gas before the propellant autoignites.

28. The method of claim 18, further comprising rupturing the case using a combination of the internal pressure from the propellant and the internal pressure from the insensitive munitions.

29. The method of claim 18, further comprising rupturing the case without producing propulsive fragments.

30. The method of claim 18, further comprising raising the internal pressure inside the case above the internal pressure burst level to rupture the case before the propellant reaches its autoignition temperature.

31. The method of claim 18, wherein applying an internal pressure to the case from a propellant comprises applying the internal pressure from a propellant that is present in the case.

32. The method of claim 18, wherein applying an internal pressure to the case from an insensitive munitions charge comprises applying the internal pressure from an insensitive munitions charge that is present in the case.